IN THE CLAIMS

Please amend the claims as follows:

Claim 1 (Currently Amended): A process for producing a high-fluidity 1-butene-based polymer satisfying the following requirements (1), (2), and (3):

(1) has an intrinsic viscosity [η] of 0.01 to 0.5 dL/g as measured in a tetralin solvent at 135°C;

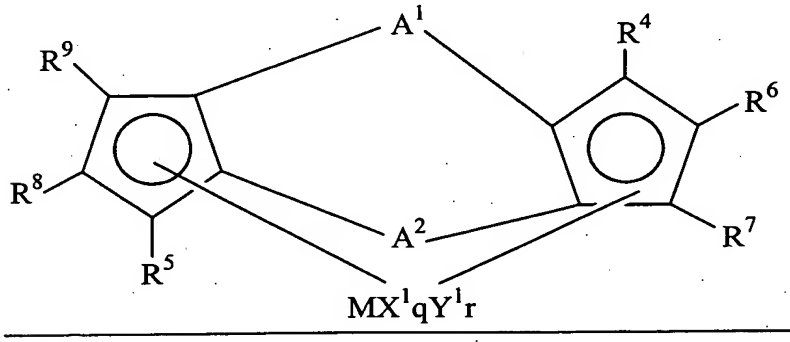
(2) is a crystalline resin having a melting point (Tm -D) of 0 to 100°C, the melting point being defined as a top of a peak observed on a highest-temperature side in a melting endothermic curve obtained by a differential scanning calorimeter (DSC) when a sample is held in a nitrogen atmosphere at -10°C for 5 min. and then heated at a temperature rise rate of 10°C/min.; and

(3) has a stereoregularity index {(mmmm)/(mmrr + rmmr)} of 30 or lower,

comprising:

homopolymerizing 1-butene, or copolymerizing 1-butene with ethylene and/or a C_3 to C_{20} α-olefin except for 1-butene, in the presence of a polymerization catalyst comprising:

(A) a transition metal compound having as a ligand, a double crosslinking type biscyclopentadienyl derivative represented by the following general formula (II):



------- (II)

wherein M is a metal element belonging to Groups 3 to 10 or lanthanoid of the Periodic Table;

X^1 is a ligand capable of forming a σ-bond with the proviso that when a plurality of X^1 groups are present, these X^1 groups may be the same or different from each other and may be cross-linked with the other X^1 or Y^1;

Y^1 is a Lewis base with the proviso that when a plurality of Y^1 groups are present, these Y^1 groups may be the same or different and may be cross-linked with the other Y^1 group or X^1;

R^4 and R^5 are independently a hydrogen atom, a halogen atom, a C_1 to C_{20} hydrocarbon group, a C_1 to C_{20} halogen-containing hydrocarbon group, a silicon-containing group or a hetero atom-containing group, and R^6 and R^7 as well as R^8 and R^9 are bonded to each other to form a ring;

A^1 and A^2 are divalent cross-linking groups capable of bonding the two ligands to each other which may be the same or different from each other, and are independently a C_1 to C_{20} halogen-containing hydrocarbon group, a silicon-containing group, a germanium-containing group, a tin-containing group, -O-, -CO-, -S-, $-SO_2-$, -Se-, $-NR^1-$, $-PR^1-$, $-P(O)R^1-$, $-BR^1-$ or $-AlR^1-$ wherein R^1 is a hydrogen atom, a halogen atom, or a C_1 to C_{20} halogen-containing hydrocarbon group;

q is an integer of 1 to 5 given by the formula:

[(valence of M) -2]; and

r is an integer of 0 to 3; and

(B) at least one component selected from the group consisting of (B-1) a compound capable of forming an ionic complex by reacting with said transition metal compound (A), and (B-2) aluminoxane.

Claim 2 (Currently Amended): A process for producing a high-fluidity 1-butene-based polymer satisfying the following requirements (1), (2), and (3'):

(1) has an intrinsic viscosity [η] of 0.25 to 0.5 dL/g as measured in a tetralin solvent at 135°C;

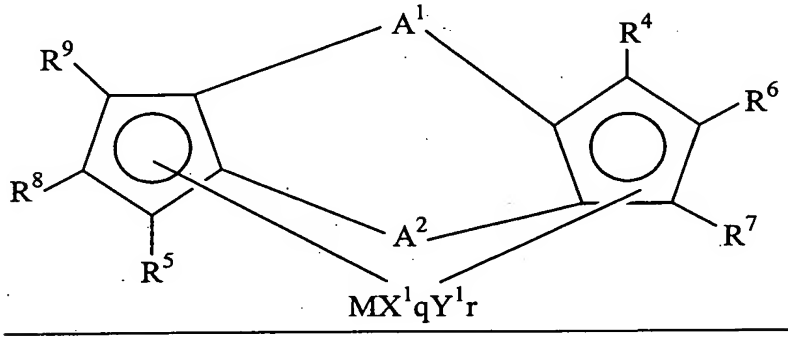
(2) is a crystalline resin having a melting point (Tm -D) of 0 to 100°C, the melting point being defined as a top of a peak observed on a highest-temperature side in a melting endothermic curve obtained by a differential scanning calorimeter (DSC) when a sample is held in a nitrogen atmosphere at -10°C for 5 min. and then heated at a temperature rise rate of 10°C/min.; and

(3') has a mesopentad fraction (mmmm) of 68 to 73% as determined from a nuclear magnetic resonance (NMR) spectrum,

comprising:

homopolymerizing 1-butene, or copolymerizing 1-butene with ethylene and/or a C_3 to C_{20} α-olefin except for 1-butene, in the presence of a polymerization catalyst comprising:

(A) a transition metal compound having as a ligand, a double crosslinking type biscyclopentadienyl derivative represented by the following general formula (II):



------- (II)

wherein M is a metal element belonging to Groups 3 to 10 or lanthanoid of the Periodic Table;

X^1 is a ligand capable of forming a σ-bond with the proviso that when a plurality of X^1 groups are present, these X^1 groups may be the same or different from each other and may be cross-linked with the other X^1 or Y^1;

Y^1 is a Lewis base with the proviso that when a plurality of Y^1 groups are present, these Y^1 groups may be the same or different and may be cross-linked with the other Y^1 group or X^1;

R^4 and R^5 are independently a hydrogen atom, a halogen atom, a C_1 to C_{20} hydrocarbon group, a C_1 to C_{20} halogen-containing hydrocarbon group, a silicon-containing group or a hetero atom-containing group, and R^6 and R^7 as well as R^8 and R^9 are bonded to each other to form a ring;

A^1 and A^2 are divalent cross-linking groups capable of bonding the two ligands to each other which may be the same or different from each other, and are independently a C_1 to C_{20} halogen-containing hydrocarbon group, a silicon-containing group, a germanium-containing group, a tin-containing group, -O-, -CO-, -S-, $-SO_2-$, -Se-, $-NR^1-$, $-PR^1-$, $-P(O)R^1-$, $-BR^1-$ or $-AlR^1-$ wherein R^1 is a hydrogen atom, a halogen atom, or a C_1 to C_{20} halogen-containing hydrocarbon group;

q is an integer of 1 to 5 given by the formula:

[(valence of M) -2]; and

r is an integer of 0 to 3; and

(B) at least one component selected from the group consisting of (B-1) a compound capable of forming an ionic complex by reacting with said transition metal compound (A), and (B-2) aluminoxane.

Claim 3 (Currently Amended): [[A]] The process according to claim 2, ~~high-fluidity 1-butene-based polymer satisfying the following requirements (1), (2), and (3'):~~

~~(1) has an intrinsic viscosity [η] of 0.25 to 0.5 dL/g as measured in a tetralin solvent at 135°C;~~

~~(2) is a crystalline resin having a melting point (Tm-D) of 0 to 100°C, the melting point being defined as a top of a peak observed on a highest-temperature side in a melting endothermic curve obtained by a differential scanning calorimeter (DSC) when a sample is held in a nitrogen atmosphere at -10°C for 5 min. and then heated at a temperature rise rate of 10°C/min.; and~~

~~(3') has a mesopentad fraction (mmmm) of 68 to 73% as determined from a nuclear magnetic resonance (NMR) spectrum,~~ wherein said polymer has a zero-shear viscosity η^0 of 300 Pa·s or lower and a tensile elongation at break of 100% or more.

Claim 4 (Currently Amended): The process ~~high-fluidity 1-butene-based polymer~~ according to claim 1 ~~or 2~~, wherein said polymer further satisfies the following requirements (4) and (5):

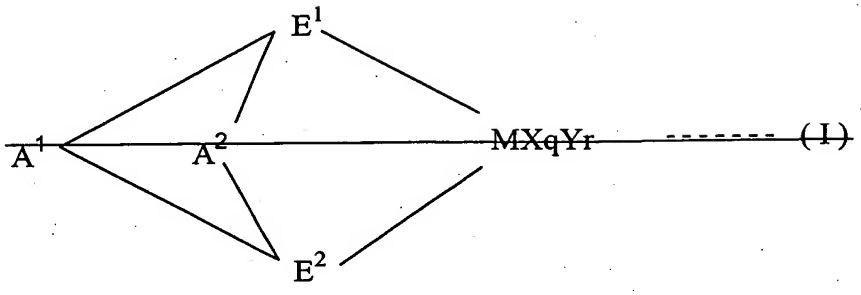
(4) a molecular weight distribution (Mw/Mn) of 4 or lower as measured by gel permeation chromatography (GPC); and

(5) a weight-average molecular weight (Mw) of 10,000 to 100,000 as measured by GPC.

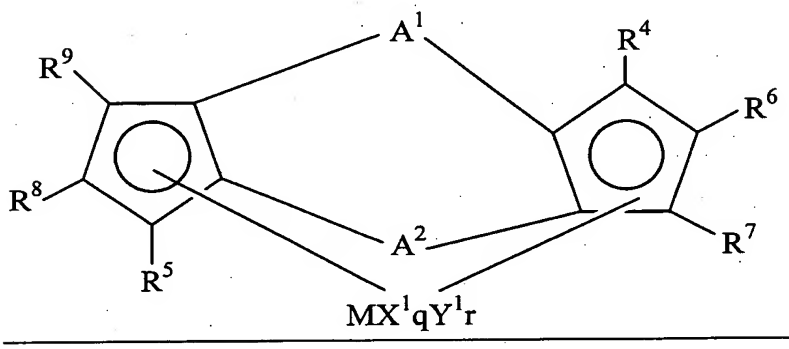
Claim 5 (Currently Amended): A process for producing a high-fluidity 1-butene-based polymer, comprising:

homopolymerizing 1-butene, or copolymerizing 1-butene with ethylene and/or a C_3 to C_{20} α-olefin except for 1-butene, in the presence of a polymerization catalyst comprising:

(A) a transition metal compound having as a ligand, a double crosslinking type biscyclopentadienyl derivative represented by the following general formula [[(I)]] (II):



~~-------- (I)~~



------- (II)

wherein M is a metal element belonging to Groups 3 to 10 or lanthanoid of the Period Table;

~~E^1 and E^2 are independently a ligand selected from the group consisting of substituted cyclopentadienyl, indenyl, substituted indenyl, heterocyclopentadienyl, substituted heterocyclopentadienyl, amide group, phosphide group, hydrocarbon groups and silicon-containing groups, which form a cross-linked structure via A^1 and A^2 and may be the same or different from each other;~~

[[X]] $\underline{X^1}$ is a ligand capable of forming a σ-bond with the proviso that when a plurality of [[X]] $\underline{X^1}$ groups are present, these [[X]] $\underline{X^1}$ groups may be the same or different from each other, and may be cross-linked with the other [[X]] $\underline{X^1}$ group~~, E^1, E^2~~ or [[Y]] $\underline{Y^1}$;

[[Y]] $\underline{Y^1}$ is a Lewis base with the proviso that when a plurality of [[Y]] $\underline{Y^1}$ groups are present, these [[Y]] $\underline{Y^1}$ groups may be the same or different from each other, and may be cross-linked with the other [[Y]] $\underline{Y^1}$ group~~, E^1, E^2~~ or [[X]] $\underline{X^1}$;

$\underline{R^4}$ and $\underline{R^5}$ are independently a hydrogen atom, a halogen atom, a $\underline{C_1}$ to $\underline{C_{20}}$ hydrocarbon group, a $\underline{C_1}$ to $\underline{C_{20}}$ halogen-containing hydrocarbon group, a silicon-containing

group or a hetero atom-containing group, and R^6 and R^7 as well as R^8 and R^9 are bonded to each other to form a ring;

A^1 and A^2 are divalent cross-linking groups capable of bonding the two ligands ~~E^1 and E^2~~ to each other which may be the same or different from each other, and are independently a C_1 to C_{20} halogen-containing hydrocarbon group, a silicon-containing group, a germanium-containing group, a tin-containing group, -O-, -CO-, -S-, $-SO_2-$, -Se-, $-NR^1-$, $-PR^1-$, $-P(O)R^1-$, $-BR^1-$ or $-AlR^1-$ wherein R^1 is a hydrogen atom, a halogen atom, ~~a C_1 to C_{20} hydrocarbon group~~ or a C_1 to C_{20} halogen-containing hydrocarbon group;

q is an integer of 1 to 5 given by the formula:

[(valence of M) - 2]; and

r is an integer of 0 to 3, and

(B) at least one component selected from the group consisting of (B-1) a compound capable of forming an ionic complex by reacting with said transition metal compound (A), and (B-2) aluminoxane.

Claim 6 (Original): The process according to claim 5, wherein 1-butene is homopolymerized in the presence of the polymerization catalyst containing an organoboron compound as the component (B).

Claim 7 (Original): The process according to claim 5, wherein 1-butene is copolymerized with ethylene and/or a C_3 to C_{20} α-olefin except for 1-butene in the presence of the polymerization catalyst containing an organoboron compound as the component (B).

Claim 8 (Canceled).

Claim 9 (Previously Presented): The process according to claim 5, wherein the component (B) is an organoboron compound.

Claim 10 (Canceled).

Claim 11 (Currently Amended): A 1-butene-based resin modifier comprising the high-fluidity 1-butene-based polymer produced by the process as claimed in claim 1.

Claim 12 (Currently Amended): A hot-melt adhesive containing the high-fluidity 1-butene-based polymer produced by the process as claimed in claim 2.

Claim 13 (New): The process according to claim 2, wherein said polymer further satisfies the following requirements (4) and (5):

(4) a molecular weight distribution (Mw/Mn) of 4 or lower as measured by gel permeation chromatography (GPC); and

(5) a weight-average molecular weight (Mw) of 10,000 to 100,000 as measured by GPC.

DISCUSSION OF THE AMENDMENT

All the claims now require that component (A) of the catalyst be the transition metal compound of formula (II) described in the specification beginning at page 19, line 3, and wherein the variables in common with that of the transition metal compound of general formula (I), described in the specification beginning at page 16, line 7, have the same meanings, except that R^1 does not include a C_1 to C_{20} hydrocarbon group.

In addition, Claims 1-4 have each been amended to become process claims. Claim 3 has been amended back to depend on Claim 2, as originally claimed. Claim 4 has been amended to depend on Claim 1 only. New Claim 13 has been added, to claim the subject matter deleted from the latter-discussed amendment to Claim 4.

Claim 10 has been canceled. Claims 11 and 12 have been converted to product-by-process claims.

No new matter is believed to have been added by the above amendment. Claims 1-7, 9, and 11-13 are now pending in the application.